

# Poplar Lake Monitoring Update

Monitoring Season 2020  
(June—September)



Prepared by Cook County Soil and Water Conservation District January 2021



During the summer of 2021, volunteers and Cook SWCD staff monitored predetermined lakes each month from June to September. Samples were taken from a designated location, often the deepest location of the lake.

Data collected includes levels of chlorophyll-a, phosphorus, and transparency. Monitors are provided equipment to collect the data, including an electronic meter, which captures the levels of pH, temperature, conductivity, and dissolved oxygen within a water column of the lake.

Collecting the data necessary to understand water quality and land use would not be possible without willing volunteers. Thank you all for your time, interest, and energy in water monitoring.



### ***Why Monitor?***

- Collect data to understand water quality.
- Inform landowners, neighbors, visitors about water quality.
- Inform landowners, neighbors, visitors about possible land use impacts to water quality.
- Engage individuals in citizen science.
- Understand suitability of water quality for different uses.
- Acquire greater understand of the aquatic ecosystem and potential stressors.

For more information on the value of monitoring in the area check out this video on the Cook SWCD website:

[https://www.youtube.com/watch?v=D2tjcnDXu8c&feature=emb\\_title](https://www.youtube.com/watch?v=D2tjcnDXu8c&feature=emb_title)

## *Standards for measuring water quality.*

Cook County is part of the Northern Lakes and Forest Ecoregion, as defined by the Minnesota Pollution Control Agency (MPCA). Each region in the state has standards for water quality. The standards for water quality are assessed during June—September.

These standards are in place to help have limits and goals for the water quality to maintain a healthy ecosystem and good water quality for all the different uses and needs of the lake.

The measurement parameters are levels of phosphorus, Chlorophyll-a, and transparency. The data collected is assessed on these standards. The table for our region is below.

*Table Source: MPCA*

## *Measurement Parameters*

**Secchi disk** — measurement of water clarity (measured in meters)

**Chlorophyll—*a*** -pigment found in algae and is a direct measure of alga quantity (measured in parts per billion)

**Total phosphorus** — is one key element necessary for growth of plants and animals; it is a limiting factor in algae growth; higher concentrations of phosphorus often leads to greater abundance of algae which means lower water clarity (measured

<i>Ecoregion</i>	<i>Total phosphorus</i>	<i>Chlorophyll— a</i>	<i>Secchi disk reading</i>
	(unit) Parts per billion (ppb)	Parts per billion (ppb)	meters
Northern Lakes and Forest—Lake Trout Lake (Class 2A)	< 12	< 3	> 4,8
Northern Lakes and Forest— Stream Trout (Class 2A)	< 20	<6	> 2.5
Northern Lakes and Forest—Aquatic Rec. Use (Class 2B)	< 30	< 9	> 2.0

## Carlson's Trophic State Index

The trophic status of a lake is the level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of the light penetration. The concept of trophic status is based on the changes in nutrient levels (total phosphorus) which causes changes in algal biomass (chlorophyll-a) which will impact the lake's water clarity (secchi disk). Data can be used to determine a lake's trophic state on the Trophic State Index (TSI). A fun fact about the Trophic State Index (TSI) is that it was developed by Dr. Robert Carlson (who seasonally resides in Cook County). It is used to describe how productive, or trophic, a lake is.

< 30	Oligotrophic; clear water; high Dissolved Oxygen (DO) throughout the year in the entire hypolimnion
30-40	Oligotrophic; clear water; possible periods of limited hypolimnetic anoxia (DO =0)
40-50	Moderately clear water; increasing chance of hypolimnetic anoxia in summer; fully supportive of all swimmable/aesthetic uses
50-60	Mildly eutrophic; decreased transparency; anoxic hypolimnion; macrophyte problems; warm-water fisheries only; supportive of all swimmable/aesthetic uses but "threatened"
60-70	Blue-green algae dominance; scums possible; extensive macrophyte problems
70-80	Heavy algal blooms possible throughout summer; dense macrophyte beds; hypereutrophic
> 80	Algal scums; summer fish kills; few macrophytes due to algal shading; rough fish dominance

### *Trophic State of Lakes:*

*Oligotrophic* = lakes that are often deep and have very low amounts of nutrients, clear, deep

*Mesotrophic* = lakes that have medium amount of nutrients, not as clear, different oxygen and nutrient cycling than oligotrophic lakes

*Eutrophic* = lakes that are nutrient rich, often full of aquatic plants, frequent algae blooms

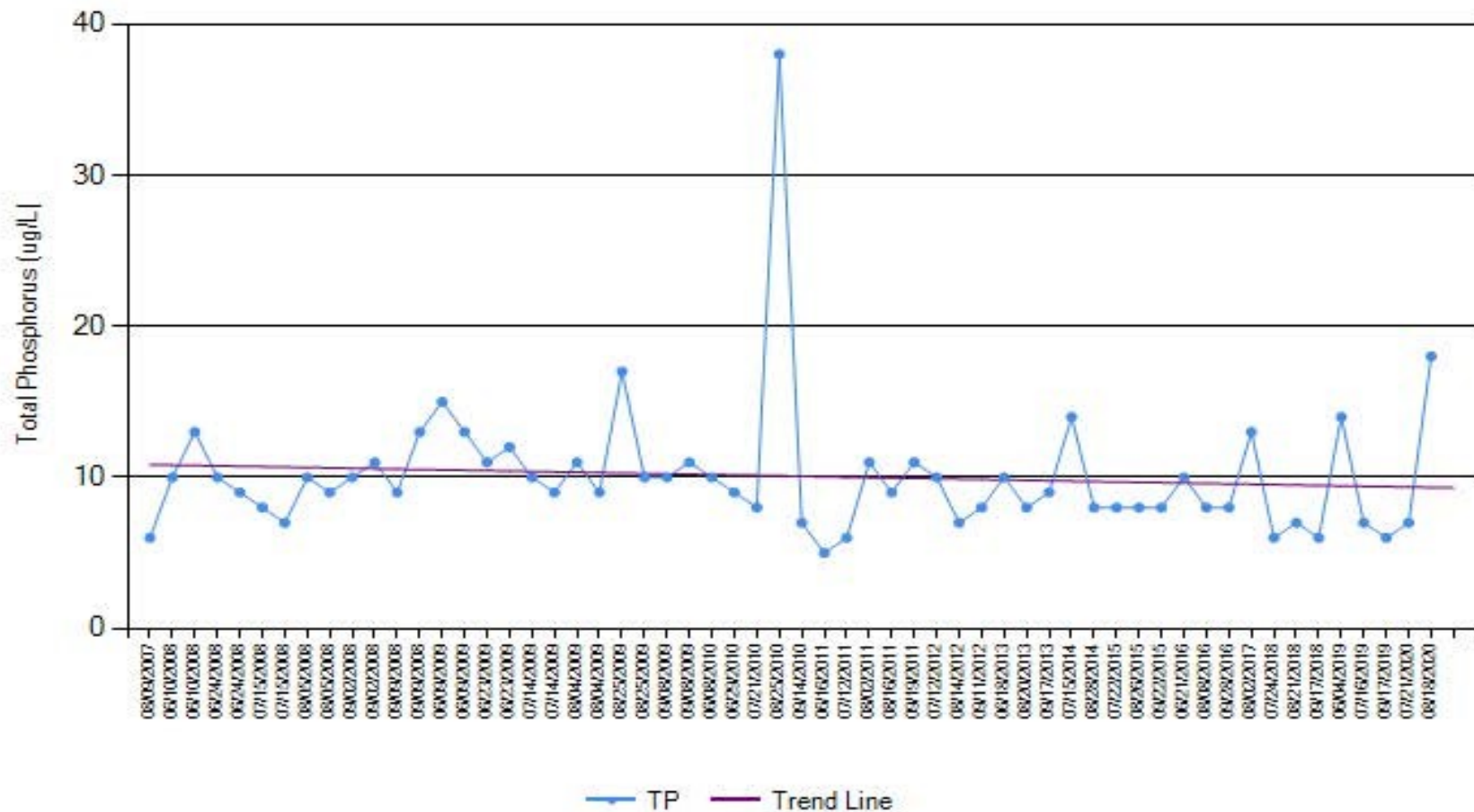




## Trend Analysis Report

County	Lake	Site	Data Evaluated	Dates Evaluated
Cook	Poplar (ID # 16-0239-00)	204		8/9/2007 - 8/18/2020

**Total phosphorus is decreasing, which indicates improving water quality (95% confidence).**



## Trend Analysis Report

County	Lake	Site	Data Evaluated	Dates Evaluated
Cook	Poplar (ID # 16-0239-00)	204		8/9/2007 - 8/18/2020

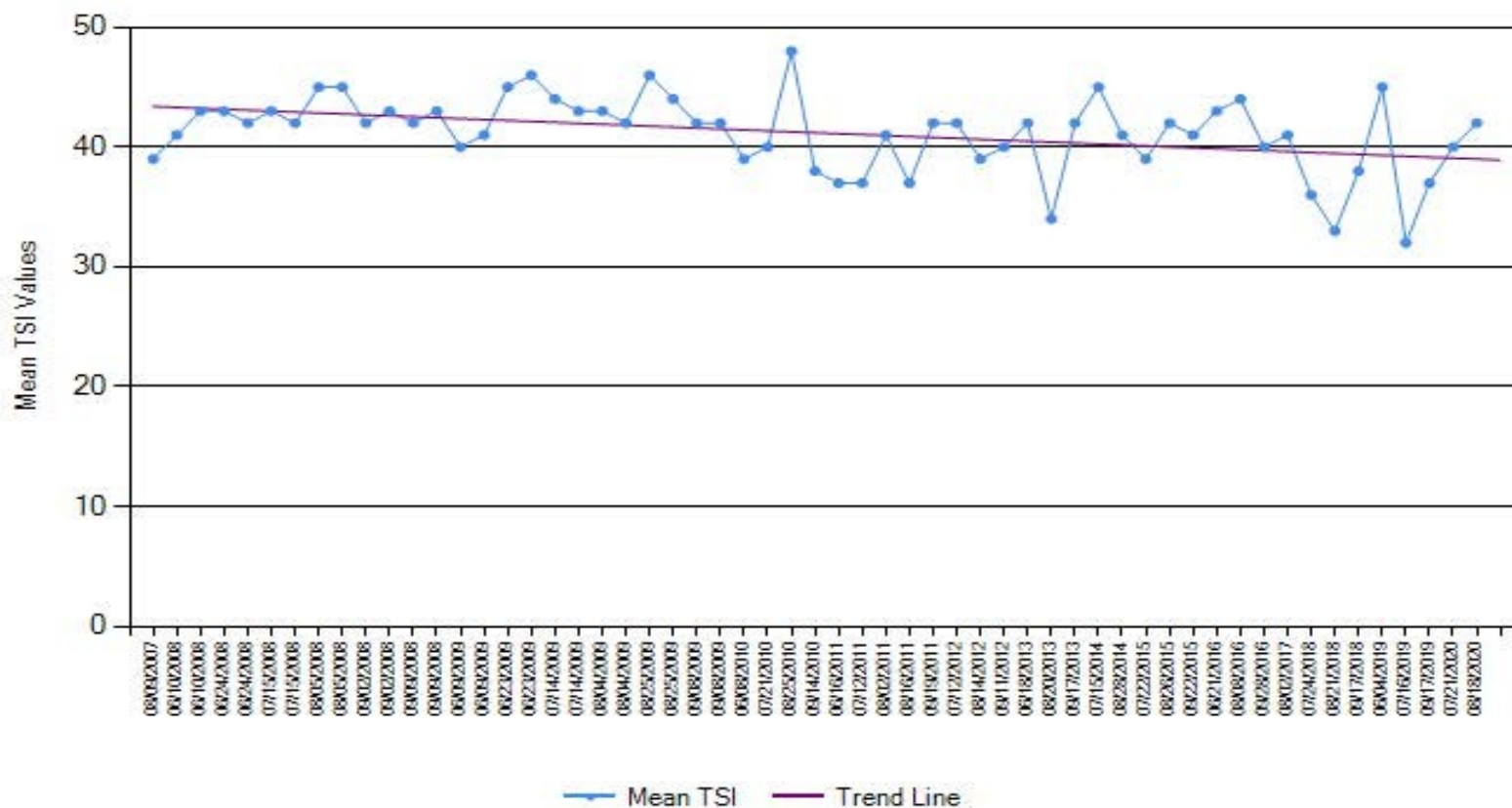
**Secchi depth is increasing, which indicates improving water quality (99% confidence).**



## Trend Analysis Report

County	Lake	Site	Data Evaluated	Dates Evaluated
Cook	Poplar (ID # 16-0239-00)	204	Mean TSI	8/9/2007 - 8/18/2020

**Mean TSI is decreasing, which indicates improving water quality (99% confidence).**



RMB Environmental Labs took data from the location that has been monitored site 204, and determined a trend analysis for the mean TSI for data that has been collected over 2017, 2018, 2019, and 2020. The more consecutive years of data for this site, the higher accuracy and confidence will be in the trend analysis. Additional information on the error factor can be found on RMB labs website ([rmbel.org](http://rmbel.org)).



# Lake Trophic State Index - MPCA Data

Poplar Lake

Source:

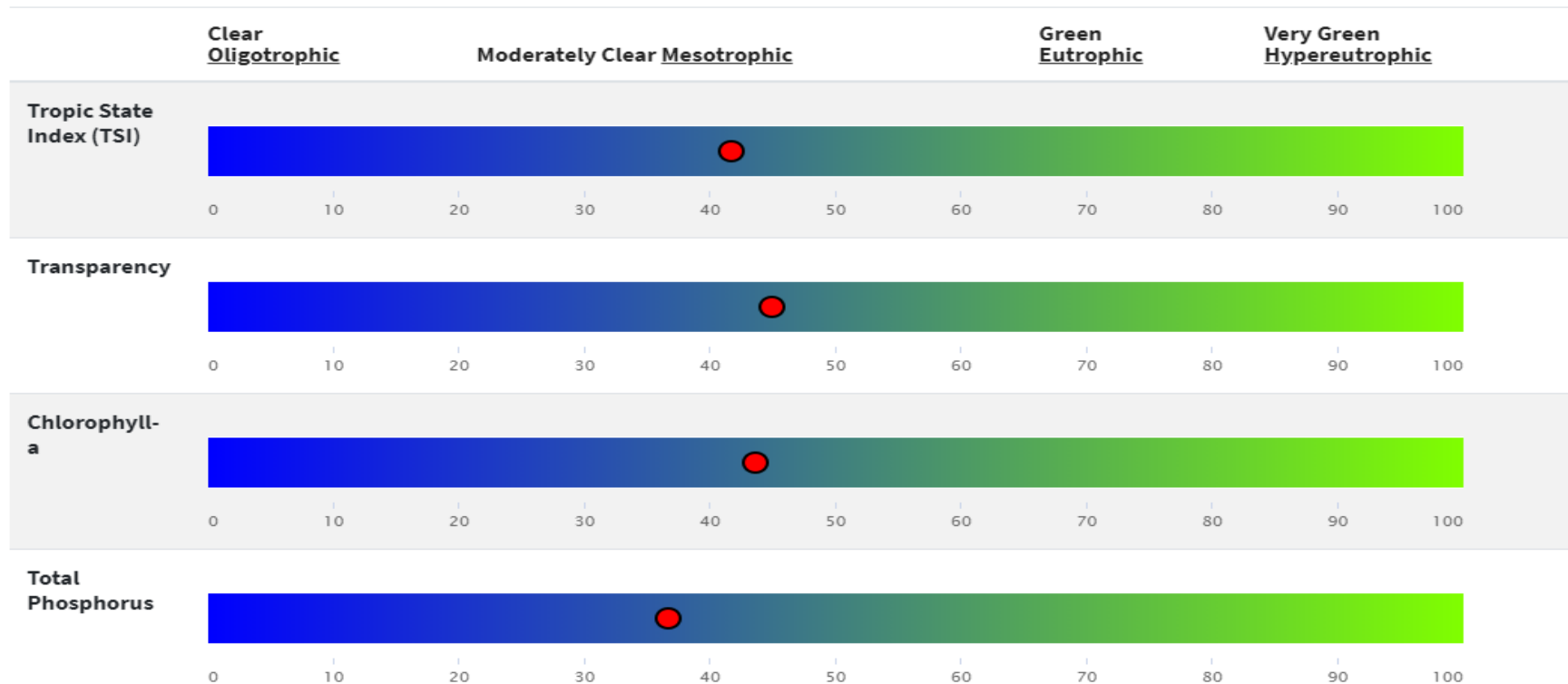
The chart represents many years of data. A better understanding of the data and trends can be found at the website above.

The lake has a trophic state of 42, which puts it in the Mesotrophic range for water quality. It is important to continue to collect water quality data and work on land use protection, restoration and best management practices to minimize nutrient and sediment loading into the lake.

## Water Quality Summary

### Recreational suitability measures

The **Trophic State Index (TSI)** is a number that summarizes a lake's overall nutrient richness. Nutrient richness ranges from clear lakes, low in nutrients (oligotrophic), to green lakes, with very high nutrient levels (hypereutrophic). The chart below shows the overall TSI rating for this lake (top bar), followed by TSI ratings for the individual parameters that contribute to nutrient richness. The TSI calculations are based on data collected between June and September 2008 to 2017.



Overall Trophic State Index for this lake: **42**

*A view of additional assessment information from the MPCA.*

**Web address is:** <https://webapp.pca.state.mn.us/surface-water/impairment/16-0239-00>

## Lakes and streams water quality dashboard



### Poplar: 20 MI NW OF GRD MARAIS (Lake)

Lake identification number: 16-0239-00

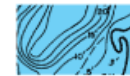
**Overall Condition:**

Suitable for swimming and wading, with good clarity and low algae levels throughout the open water season.



#### Eating the fish

Consumption advisories for this waterbody (DNR).



#### Lake Finder (DNR)

Invasive species, lake depths, and more for this waterbody.

Description	Assessments	Monitoring Data	Water Quality Summary	Transparency Trend	Land Use
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#### Description

Major Watershed	Lake Superior - North <a href="#">View</a>
County	Cook
Location	20 MI NW OF GRD MARAIS
Surface Area	758.14 acres
Maximum Depth	73 feet
Ecoregion	Northern Lakes and Forests
Use Classification	1C, 2Bd, 3C



***In Conclusion:***

- Poplar Lake is showing a trend towards improving water quality. Land use is one of the biggest impacts to water quality.
- Continued water quality data collection will aid in understanding land use impacts, quality of the water, and if any trends are noticed.
- There are many resources available to landowners to better inform them about the lakes in their area.
- There are also many resources available to landowners to aid in protection and restoration strategies.



***Resources for water quality data and lakes:***

***RMB Labs:*** <https://www.rmbel.info/>

***MN DNR Lake finder:*** <https://www.dnr.state.mn.us/lakefind/index.html>

***MPCA water quality data compiled:***  
<https://www.pca.state.mn.us/water/water-quality-data>